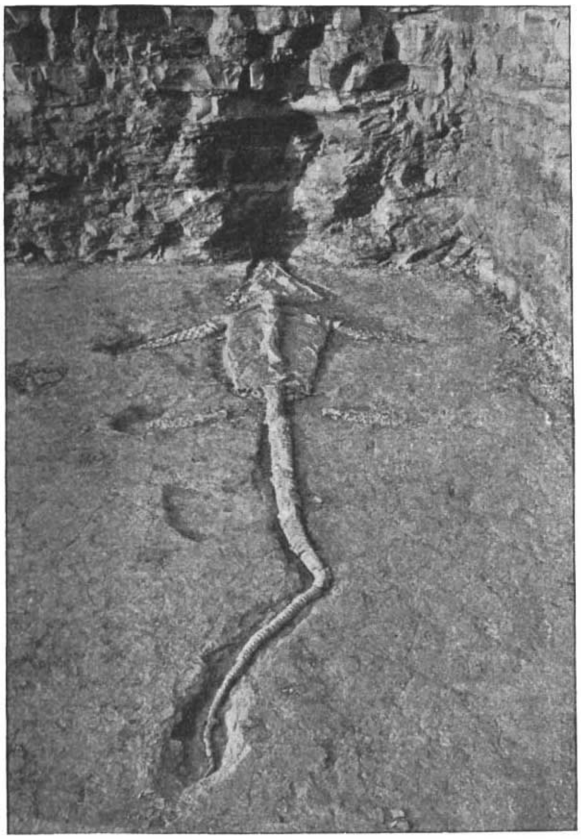
and not a little vigilance is necessary to protect it from dishonest visitors, attempting to purloin teeth or fragments. It has been beautifully photographed by Mr. H. Elkington, of Broadwell, Rugby (a reproduction of the photograph accompanies this notice), who will, on application, furnish copies to geologists and others desiring them.



W. T.

DR. JOHN HOPKINSON, F.R.S.

THE news that Dr. John Hopkinson, F.R.S., met his death in a terrible mountain accident on Saturday last, has been received with deep regret in the scientific world. His name is familiar to every student of electricity and its applications, and by his death electrical science has lost one of its most active and brilliant workers. It appears from the telegraphic reports that Dr. Hopkinson, who was a practised mountaineer, started from Arolla on Saturday morning, with his son John and two daughters, to ascend the Petite Dent de Veisivi, one of the striking points dominating Evolena, in the Val d'Hérens, running south from the Rhône Valley at Sion. The ascent is not considered a very dangerous one, and the party went without guides. Nothing having been seen of them on Saturday night, search parties were organised, and the melancholy discovery was made that a catastrophe had occurred, the dead bodies of Dr. Hopkinson and his three children being found roped together, but terribly mutilated, at the foot of the highest cliffs. How the accident happened is not known, but probably one of the party slipped whilst climbing a cliff, and all four then fell from rock to rock several hundred feet to the moraine below. Like Francis Balfour and Milnes Marshall, Dr. Hopkinson has lost his life while mountain climbing, and like them also he leaves behind a rich record of work done for the advancement of science.

Dr. Hopkinson was born at Manchester in 1849, and was the eldest son of Alderman Hopkinson, an ex-Mayor of that city. In his sixteenth year he went to Owens College, where he remained for two years and a half, and then went to Trinity College, Cambridge. In 1871 he was Senior Wrangler and First Smith's Prizeman, and was appointed fellow and tutor of his college. While at Cambridge he obtained the D.Sc. degree at London University. Referring some years later to the influences which helped to mould his career, he said:—

"My father cultivated in me a taste for science from a time before I can remember; my mother gave me the first systematic instruction of which I have any recollections. If my father gave me my first taste for science, you may be sure that taste was encouraged at Owens College. Mathematics is the most essential weapon of the physicist, and nowhere can mathematics be learned as at Cambridge. I owe to Sir William Thompson the first impulse to experimental work in electricity and magnetism. He has been to me for many years the kindest of friends, always ready to encourage and to help."

After leaving Cambridge Dr. Hopkinson was for six years with Messrs. Chance and Co., near Birmingham, as their engineer. He removed to London in 1878, and, after commencing practice as a general engineer, took up electrical engineering, in which branch of applied science his most valuable investigations have been accomplished. He was elected a Fellow of the Royal Society in 1878, and received one of the Royal Medals of the Society in 1890, for his researches in magnetism and electricity. In presenting the medal, the President pointed out that Dr. Hopkinson's researches comprised investigations of the effect of temperature upon the magnetic properties of iron, nickel, and various alloys of these metals. Before these investigations were published it was thought that increased temperature tended to diminish the magnetic susceptibility of iron. Dr. Hopkinson's experiments showed, however, that, on the contrary, the magnetic susceptibility increases enormously as the temperature increases, until the temperature reaches about 660° C.; beyond this temperature iron entirely ceases to be magnetic. He also made a series of determinations of the specific inductive capacities and refractive indices of a large number of transparent dielectrics, the results of which are of great importance in the theories of electricity and light. In addition to these researches, he introduced many improvements into lighthouse equipment, notably the "group flashing apparatus."

Dr. Hopkinson's contributions to the theory of dynamo-electric machinery are most important; and to him electricians owe the method, now so extensively used, of solving problems relating to dynamos by the use of the "characteristic curve." On the subject of dynamo-electric machinery Dr. Hopkinson was, indeed, a leading authority. A volume containing a number of his papers on this and allied subjects was published in 1892, and it constitutes a valuable testimony to the scientific and practical importance of his researches. The work contains an account of a very complete and exhaustive set of experiments on dynamo machines under working conditions, and graphical representations of the results. In referring to Dr. Hopkinson's work in these columns, the reviewer remarked: "No device in the whole history of the evolution of the dynamo has been of more general service than his plan of exhibiting the results of experiments in the well named characteristic curve of the machine. This did for the dynamo what the indicator diagram had long been doing for the steam engine, though not, of course, in the same way. With the most admirable simplicity

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this curve of electromotive forces as ordinates, and currents as abscissæ, gave just the information required regarding the action of the machine." Dr. Hopkinson also showed how the characteristic curve of the dynamo could be used to give the conditions under which an arc lamp could be made to work. He was, in fact, a pioneer in the scientific study of dynamo-electric machinery and its uses. In conjunction with his brother, Mr. E. Hopkinson, he was the first to apply the idea of the magnetic circuit, in a consistent manner, to the discussion of the results of experiments on different types of dynamo, and his contributions to this subject have been most valuable in suggesting new methods and machines. His papers on the behaviour and capabilities of direct current machines, and of alternators, have proved of the greatest service to practical electricians, and are counted among the classics of the subject

Dr. Hopkinson was professor of electrical engineering in King's College, London, and a member of the Councils of the Institutions of Civil and Mechanical Engineers. He was the "James Forrest" lecturer of the former Institution in 1894, and his discourse on the service mathematics has rendered and can render to engineers and engineering was printed at the time in these columns. In himself he represented the rare combination of mathematical and mechanical knowledge, and the results of his life's work stand out as the clearest evidence of the close relationships between pure and applied science. It is a mournful task to have to chronicle the death, in such tragic circumstances, of an investigator who has worked so well for the increase of knowledge and the advancement of electrical engineering.

NOTES.

THE Fourth International Congress of Physiologists held its meetings with great success at Cambridge last week from Tuesday, August 23, to Friday, August 27, inclusive. It was probably the largest assembly of the kind that has yet met. Prof. Michael Foster was President. The following nationalities were represented: Austria, Belgium, Canada, Denmark, Egypt, France, Germany, Great Britain and Ireland, Holland, Hungary, India, Italy, Japan, Roumania, Russia, Sweden, Switzerland, and the United States. The offer of Profs. Mosso (of Turin), and Golgi (of Pavia), for the reception of the Fifth Congress in Italy in 1901 was cordially accepted. The Organising Committee for the Fifth Congress was elected, to consist of the following names: Angelo Mosso (Turin), President. Chr. Bohr (Copenhagen), H. P. Bowditch (Harvard), A. Dastre (Paris), M. Foster (Cambridge), L. Fredericq (Liège), P. Grützner (Tübingen), P. Heger (Brussels), H. Kronecker (Bern), W. Kuhne (Heidelberg), C. S. Sherrington (Liverpool), and W. Wedenskij (St. Petersburg). The place of meeting that has been chosen for 1901 is the Physiological Institute of the University, Turin, and the time the latter half of September. The local arrangements for the present Congress proved very satisfactory. The opinion was generally expressed that the simultaneous session of the sister Congress of Zoologists at Cambridge, far from proving inconvenient, considerably enhanced the pleasure of the meeting.

THE Reale Accademia dei Lincei has recently elected the following men of science as associates and foreign members of the Academy:—National Associates: in physics, Profs. A. Righi, A. Roiti, and A. Pacinotti; in geology and palæontology, Signore G. Scarabelli; in zoology, Prof. C. Emery. Correspondent in mechanics, Prof. C. Somigliana. Foreign Members: in mechanics, Prof. A. G. Greenhill and V. Voigt; in physics, Prof. W. C. Röntgen; in geology and palæontology, Prof. A. Karpinsky and Sir Archibald Geikie; in zoology, Prof. E. Ray Lankester.

IN a special number of their *Atti*, the Reale Accademia dei Lincei, of Rome, announces the recent awards of prizes given by the King of Italy for the period ending in 1895. For the Royal prize for mathematics, eight competitors sent in no less than about ninety written and printed memoirs; and after a critical examination of these, the judges have now divided the prize equally between Prof. Corrade Segre and Prof. Vito Volterra. The papers submitted appear to have been of a very high standard of excellence, and are stated to form a worthy sequel to the works of Betti, Brioschi, and other illustrious Italian mathematicians. The award of the Royal prize for social and economic science has been deferred for a period of two years. A similar decision has been arrived at in the case of the prize for astronomy, but a sum of 3000 lire has been awarded to Prof. Filippo Angelitti in consideration of his valuable work in editing and discussing the unpublished writings of Prof. Carlo Brioschi. The prize for philology has been divided between Prof. Angelo Solerti and Prof. Remigio Sabbadini, and finally a Ministerial prize of 1500 lire for natural science has been awarded to Prof. L. Paolucci for his monograph on the fossil plants of the Ancona district.

PROF. BEHRING'S action in applying for a patent in the United States as sole inventor of diphtheria antitoxin excited surprise, but the announcement that the authorities at Washington have recently decided to grant the patent has (says the *Lancet*) caused a feeling of something like consternation among the American manufacturers of antitoxin. It was in January 1895, that Prof. Behring—his assignees being the Höchst-Farbwerke, the manufacturers of the serum in Germany—first applied for a patent for his diphtheria antitoxin; the application was then refused, and has been refused four times since on the ground that Prof. Behring was not the sole inventor of diphtheria antitoxin, and had consequently no right to claim a monopoly of the manufacture and sale of the same. However, in June of this year the patent officials at Washington overlooked their objections and granted the patent. But although Prof. Behring has succeeded in gaining a patent for his diphtheria antitoxin, it is the intention of the American manufacturers of antitoxin and the several Boards of Health to contest at every step his right to create a monopoly.

PARTICULARS of the life and work of Dr. William Pepper, whose death at Pleasanton, in California, was recently announced, are given in the *Lancet*, and are here abridged. William Pepper was born in August 1843, so that at the time of his death he was not quite fifty-five years of age. His father, Dr. William Pepper, was a prominent physician and Professor of the Theory and Practice of Medicine in the University of Pennsylvania, and in 1881 the son was elected to the same chair. In the same year he was elected Provost of the University, a post which he held until 1894. On his retirement from office he gave practical and munificent effect to his views upon the extension of the medical curriculum by a donation of 50,000 dollars, with a promise of 1000 dollars as an annual subscription for five years, towards an endowment fund to pay for greater teaching facilities for science in the University. In the same year the course was extended to four years. Prof. Pepper is known to the medical profession chiefly by his contributions to, and able editing of, the "System of Practical Medicine by American Authors." This System, which was published in 1885, did for medical knowledge in America what Ziemssen's Cyclopædia had done ten years previously in Germany. It systematised and correlated the varying scientific opinions of persons all chosen to write because of their position and claims

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